

WHAT IS CLAIMED IS:

1. A method for direct image pick-up of a particular granular speck pattern generated by reflecting light of a laser beam depending on a degree of roughness of the surface of an object to be inspected, said method comprising the steps of:

irradiating said object to be inspected with the laser beam;

5 directly picking up said granular speck pattern in a relatively well lighted environment using a lensless video camera having a CCD (Charge Coupled Device) element incorporated in said video camera; and

providing a shielding tube coupled to said camera to shield extraneous light rays.

2. Apparatus for direct image pick-up of a particular granular speck pattern generated by reflecting light of a laser beam depending on a degree of roughness of the laser beam irradiated surface of an object to be inspected, said apparatus comprising:

a lensless video camera having a CCD element incorporated in said video camera; and

a shielding tube coupled to said camera for shielding extraneous light rays.

3. A method for direct image pick-up of a particular granular speck pattern generated by the transmitted light of a laser beam diffusively reflecting depending on a degree of roughness of the laser beam irradiated onto the surface of an object to be inspected or shapes of fine ingredients constituting said object to be inspected, said method comprising the steps of:

5 irradiating said object to be inspected with the laser beam;

directly picking up said granular speck pattern in a relatively well lighted environment using a lensless video camera having a CCD element incorporated in said video camera; and

a shielding tube coupled to said camera to shield extraneous light rays.

4. Apparatus for direct image pick-up of a particular granular speck pattern generated by transmitted light of laser beam diffusively reflecting depending on a degree of roughness of the laser beam irradiated surface of an object to be inspected or on shapes of fine ingredients constituting said object to be inspected, said apparatus comprising:

5           a commercially available video camera having a CCD image detector and deprived of its image forming lens; and

          a shielding tube coupled to said camera to shield extraneous light rays from striking the CCD of said camera.

5.       Apparatus for direct image pick-up of a particular granular speck pattern comprising:  
          a laser for directing a laser beam onto the surface of an object to be inspected;  
          a digital camera having a CCD element incorporated in said camera; and  
          a shielding tube coupled to said camera for shielding extraneous light rays.

6.       A method for direct image pick-up of a particular granular speck pattern generated by the transmitted light of a laser beam diffusively reflecting depending on a degree of roughness of the laser beam irradiated onto the surface of an object to be inspected or shapes of fine ingredients constituting said object to be inspected, said method comprising the steps of:

          irradiating said object to be inspected with a laser beam;  
          directly picking up said granular speck pattern in a relatively well lighted environment using a lensless digital camera having a CCD element incorporated in said camera; and  
          a shielding tube coupled to said camera to shield extraneous light rays.

7.       Apparatus for direct image pick-up of a particular granular speck pattern generated by transmitted light of laser beam diffusively reflecting depending on a degree of roughness of the laser beam irradiated surface of an object to be inspected or on shapes of fine ingredients constituting said object to be inspected, said apparatus comprising:

5           a lensless video camera having a CCD image detector for receiving light directly onto said CCD; and

          a shielding tube coupled to said camera to shield extraneous light rays from striking the CCD of said camera.